

REMARKS

This Amendment is in response to the Office Action dated June 19, 2002. Claims 20 and 27 have been canceled as being identical to claims 19 and 26. Claims 1, 3, 5, 8, 10, 15, 22 and 44 have been amended. Claims 1-19, 21-26, 28 and 44 remain in this application for consideration.

The applicant appreciates the time spent with Examiner Courson and Supervisory Examiner Gutierrez in the interview on September 6, 2002. Applicant believes the discussion was fruitful and the claim amendments and remarks are presented consistent with that discussion.

As discussed in the interview, the intended use of the claimed invention is for laying out bowling balls, specifically for identifying the particular physical features of a bowling ball, such as the finger holes, the positive axis point, the center of gravity, and the like, which all affect the rolling dynamics of a bowling ball. As such, the preamble of each independent claim includes the language "a device for laying out a bowling ball."

Applicant confirms the provisional election of claims 1-28 and 44. Claims 29-43 are held in abeyance for further prosecution in a divisional application.

1. Claim Amendments

Each independent claim (Claims 1, 8, 15, 22 and 44) has been amended to more clearly recite that the base portion is semi-spherical in shape, and that the base portion contacts the curved surface of a bowling ball. This feature is important because the base portion needs to closely sit on the bowling ball to allow the arms to rotate around it. Each independent claim (other than 44) has also been amended to remove reference to "angle indicator" as a modifier of the "arm" structure.

The arm limitation in each independent claim has been amended to more clearly recite that the arms are curved to extend along the curved surface of the bowling ball. This is important because the arms are used to align and measure the locations of the various physical parameters of a bowling ball. If the arms were not curved to extend along the surface of the bowling ball, then the arms would be difficult to use to perform their desired function.

Claims 3 and 10 (depending on 1 and 8, respectively) have been amended to more clearly recite that each arm has a length sufficient to extend at least a quarter of the way along the outer surface of the bowling ball.

Claim 5 (depending from claim 1) has been amended to correct the antecedent basis issue (“indicator arm”) raised by the Examiner.

2. Claim Objections

The Examiner objected to claims 1-7, 20 and 27 for various formality reasons. Each of these reasons has been specifically addressed. Claims 1, 8, 15 and 22 have been amended to eliminate the antecedent basis issue related to “angle indicator arms.” Claim 5 has been amended to overcome a similar rejection, and claims 20 and 27 have been canceled due to their duplicative of claims 19 and 26, respectively. These objections are now moot and the Examiner is requested to withdraw such objections.

3. Section 112 Rejections

Claims 3 and 10 were rejected as being indefinite for defining the length of the arms based on the size of bowling ball. As the Examiner indicates, the bowling ball is not being claimed. Applicant believes the amendments to claim 3 and 10 overcome this rejection. The amendments provide that each arm has a length, and then provides that length is sufficient to allow the arms to extend more than a quarter of the way around the bowling ball. This is believed to be an acceptable way to claim this particular element. Withdrawal of this rejection is respectfully requested.

4. Section 102 Rejections

Claims 1, 2, 4, 6, 7, and 44 are rejected as being anticipated by the Cannon reference (US Pat. No. 5,732,474). Cannon does not show, nor render obvious, a spherical base portion, among other distinctions. For this reason at least, these claims are believed to be allowable over the Cannon reference. Withdrawal of this rejection is respectfully requested.

5. Section 103 Rejections

Claims 3 is rejected as being obvious over Cannon alone. Claim 3, as amended, provides “at least one of said plurality of arms having a length sufficient to extend more than [halfway] a quarter of the way down the circumference of the bowling ball.” The length of the at least one

arm is believed to be properly claimed, thus overcoming the Examiner's basis for not considering this limitation. This limitation is not rendered obvious in the cited reference.

Further, the length of the arms, while functional at any length, have additional benefits when they each extend at least a quarter of the way down the bowling ball. This allows the user to access the entire top hemisphere of the ball for layout purposes. Further, claim 3 depends from and further limits claim 1, which is believed to be allowable. Withdrawal of this rejection is respectfully requested.

Claim 5 is rejected as being obvious over Cannon in light of Albright (US Pat. No. 3,096,586). Claim 5 depends from and further limits claim 1, which is believed to be allowable. Withdrawal of this rejection is respectfully requested for at least this reason.

Claims 8 through 28 are rejected over Cannon in view of Albright, and further in view of Amburgey (US Pat. No. 3,161,041). Applicant believes the claims as amended all overcome this combination of references. In addition, there is no motivation to combine the Amburgey reference with the other two, as the structure would be inoperable if that combination was made. The fixed-position ribs, that extend at right angles to the surface of the bowling ball, are not conducive to the implementation of at least one arm rotating around the base portion along the surface of the bowling ball. Claims 8-28 are thus, for at least the above-stated reason, believed to be allowable.

6. Conclusion

Although specific reference has been made above to certain patentable elements of the amended independent claims, it should be understood that these are by no means the only patentable elements contained within these claims. Similarly, while the Applicants assert that the dependent claims are patentable as depending from patentably distinct independent claims, the Applicants make this statement without reference to the additional bases of patentability contained within each of the dependent claims.

In light of the above, claims 1-19, 21-26, 28 and 44 of this application are believed to be allowable. Allowance is respectfully requested.

Attached hereto is a glossary used in the interview with the Examiner on September 6, 2002.

Also attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**" If any fees or petitions are required or associated with this Amendment, consider this a petition therefor and charge Deposit Account No. 04-1415 the required additional amount. If the Examiner finds any issue that may be resolved in a telephone conference, please do not hesitate to contact the undersigned.

If the Examiner believes any issues are still present that may be resolved in a phone conference, please do not hesitate to contact the undersigned.

Signed at Denver, Colorado, 21st day of October 2002.

Respectfully submitted,

A handwritten signature in cursive script, reading "Lee R. Osman", is written over a horizontal line.

Lee R. Osman, Reg. No. 38,260
DORSEY & WHITNEY LLP
Attorney for Applicant

USPTO Customer No. 20686

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 1, 3, 5, 8, 10, 15, 22 and 44 have been amended as follows:

1. (Once Amended) A device for laying out a bowling ball, said device comprising:
a semi-spherical base portion, having a center, [adapted to substantially] for [rest on] contacting a curved surface of a bowling ball, the perimeter of said base portion including degree indicators; and

at least four curved arms for extending along [adapted to substantially rest on] the curved surface of a bowling ball, said arms including length measurement indicators, said [angle indicator] arms connected with and extending from said base portion;

wherein at least two of said [angle indicator] arms are adapted to rotate about the center of said semi-spherical [curved] base portion.

3. (Once Amended) The device in claim 1, wherein:
at lease one of said plurality of arms having a length sufficient to extend more than [halfway] a quarter of the way down the circumference of the bowling ball.

5. (Once Amended) The device in claim 1, wherein:
an edge of each of said at least four [indicator] arms is aligned with the center of said base portion.

8. (Once Amended) A device for laying out a bowling ball, said device comprising:
a [curved] semi-spherical base portion [adapted to substantially rest on] for contacting a curved surface of [a] the bowling ball, said base portion defined by a solid perimeter portion including degree indicators, a substantially open middle portion, and a center portion, including a center aperture, joined with said perimeter portion; and

at least four curved [angle indicator] arms for extending along the [adapted to substantially rest on a] curved surface of the [a] bowling ball, said [angle indicator] arms including length measurement indicators, said [angle indicator] arms connected with and extending from said center portion of said [curved] semi-spherical base portion;

wherein at least two of said angle indicator arms are adapted to rotate about said center aperture of said center portion.

10. (Once Amended) The device in claim 8, wherein:
at least one of said plurality of arms having a length sufficient to extend[s] more than a quarter of the way [halfway] down the circumference of the bowling ball.

15. (Once Amended) A device for laying out a bowling ball, said device comprising:
a semi-spherical base portion for contacting [adapted to substantially rest on] a curved surface of a bowling ball, the perimeter of said base portion including degree indicators and the center of said base portion including a aperture; and

at least three curved [angle indicator] arms for extending along the [adapted to substantially rest on a] curved surface of a bowling ball, said [angle indicator] arms including length measurement indicators, said [angle indicator] arms connected with and extending from said [curved] semi-spherical base portion;

wherein at least one of said [angle indicator] arms is adapted to rotate about the center of said [curved] semi-spherical base portion.

22. (Once Amended) A device for laying out a bowling ball having a spherical shape and a curved outer surface, said device comprising:

a semi-spherical [curved] base portion adapted for contacting the [to substantially rest on a] curved surface of [a] the bowling ball, said base portion defined by a center portion including degree indicators and including a center aperture; and

at least four curved [angle indicator] arms for extending along the [adapted to substantially rest on a] curved surface of a bowling ball, said [angle indicator] arms including length measurement indicators, said [angle indicator] arms connected with and extending from said center portion of said semi-spherical [curved] base portion;

wherein at least two of said [angle indicator] arms are adapted to rotate about said center aperture of said center portion.

44. (Once Amended) A device for laying out a bowling ball, said device comprising:

a semi-spherical base portion, having a center , for contacting the [adapted to substantially rest on a] curved outer surface of a bowling ball; and

at least [one] two curved arm for extending along [adapted to extend along] the curved surface of the bowling ball, said at least two arms [arm] connected with and extending from the base portion;

wherein [said other] a third arm is curved to extend along the curved surface of the bowling ball, and is adapted to rotate about the center of said base portion.

END OF DOCUMENT

BALL TALK

GLOS SARY

Axis Leverage - A drilling layout where the pin is $3\frac{3}{8}$ " from the PAP and in a 10:30 direction from the CG. The CG is 0" to $1\frac{1}{2}$ " from the PAP (depending on pin out distance). The balance hole is 0" to 2" from the PAP on a line running thru the pin and CG.

Axis of Rotation - (Side Roll) this is a measure of the direction of the initial rotation on the ball with respect to the lane. Measurement of the angle between the initial spin axis and the foul line running across the line. A zero degree axis of rotation is all forward roll. A 90-degree axis of rotation is most likely all side roll. The only way axis rotation can be measured is by the use of a camera. There is no way to measure axis rotation by the ball track. At any point in the path of the ball on the lane, the axis rotation must be greater than or equal to the axis tilt.

Axis Tilt - The distance the PAP is above the middle of the ball measured in degrees. A full roller or high track style would have little or no axis tilt. The initial spin axis (bowler's release axis) would be parallel or close to parallel with the lane surface. One rotation of the ball would cover the major diameter of the ball. A spinner would have an initial spin axis (bowler's release axis) tilted up from the lane. The ball track would be far away from the thumb and finger holes. One rotation of the ball would cover a much smaller diameter than other bowlers. The spinner style tends to get the ball further down the lane before it hooks.

Axis Weight - Axis weight is a drilling pattern designed to produce little or no

track flare and get the ball into a early roll with little backend reaction. Axis weight has the pin located on or near the bowlers PAP. The core is positioned along the initial spin axis (bowler's release axis). This places the core in a stable position. The ball will be initially rotating about the minimum RG axis, which is a stable core position. Therefore, it will continue to rotate about this axis creating no track flare. This reduces the backend reaction.

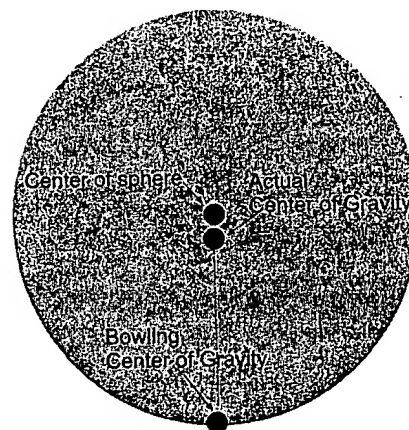
* **Balance Hole** - (or weight hole or X-Hole) an extra hole in a ball, which was originally used to bring the ball within ABC specifications for imbalance (static balance). X-holes are now used also to adjust the amount of track flare and the position of the narrow and wide points of the track to change performance. The maximum allowance diameter for a balance hole is $1\frac{1}{4}$ " for ABC and $1\frac{3}{8}$ " for the PBA.

Backend - Area of the lane closest to the pin deck (last 20-25 feet). It is the area of the lane that is not oiled. The oil moves to the area of the backend due to bowling activity, which is referred to as "no backends" or "carrydown." "Strong backends" are lanes in which the ball hooks a lot the last 20 feet. For our measuring purposes, backend only measures the amount of hook from the breakpoint to the point of hookout. It does not matter where on the lane this happens or how many feet it takes the ball to make it through the hook cycle.

Coefficient of Friction - The coefficient of friction (also called COF, or friction) is a measurement of the force it takes to slide an object across another surface divided by object's weight. In bowling, the coefficient of friction refers to how well the bowling ball grabs a dry lane surface. If lane oil is present the ball slides on the lane surface very easily and there is a low COF. If there is no oil on the lane, the ball does not slide as easily and the coefficient of friction is high.

* **Center of gravity (CG)** - The center of gravity is the "point of application" used in scientific calculations when applying

gravitational forces to an object. This point is the object's center of static balance, like the mid-point of a pencil where it can be balanced on the end of a finger. In bowling balls this position is inside the ball and is no more than 0.050" from the geometric center of the sphere. Drawing a line from the center of the bowling ball, through the center of gravity, and extending it to the surface of the ball is located what in bowling we call the "Center of Gravity", a point on which the bowling ball could be balanced on a very small rod. (See diagram)



* **Centerline or Span line** - A vertical line that passes between the finger holes and through the center of the thumb hole

Core Density - For our reviews, this refers to the number of different pieces or sections involved in the design of the interior of the ball.

Core Torque - This refers to the smoothness or flippiness of the ball at the breakpoint. A high torque ball will flip the most; a low torque ball will have the most even break. Players who generate more torque through their release generally like balls with less torque. Bowlers who are "roll" bowlers generally have more success with higher torque balls.

Differential RG - This is the difference between the minimum and maximum RG axis on the ball. This property determines the track flare potential. The maximum

allowable differential RG is 0.080 inches. The more the differential RG the more potential for track flare. The flare increases the friction between the ball and the lane.

Durometer - This is a gage for measuring the hardness of a ball. ABC and PBA require a minimum hardness of 72.

Flare - Flare is created when a bowling ball moves from its release axis toward its referred spin axis. This is caused by the ball's differential, RG, and the position of the core relative to the bowler's release axis.

Full Roller - This is a bowling style where the ball will track between the finger and thumbhole and roll across the full circumference of the ball.

Grip Center - The intersection of the midline and the centerline of the grip.

Heads - This is the front part of the lane. Also called the maple area of the lane because of the material from which it is made (in wood lanes).

High RG drilling - This is a drilling pattern where the pin is located at approximately 90 degrees (or 6 to 6-3/4") to the PAP. It is called this because the core is initially rotating around its highest RG axis off the bowler's hand. This results in the ball skidding further down the lane before hooking. The pin may be positioned close to or in the bowler's track.

Hook out - This is when the ball has completed hooking and begins to travel in a straight line. The stages of the ball path are described as skid, hook, and roll. After the ball skids in the oil and hooks on the dry backends, it will eventually start to just roll. This is hook out, or commonly known as roll out.

Hook Potential (Total Hook) - A scale used to compare how much different balls will hook when an equal force is applied. Generally, in our tests it equates to two boards per point.

Label Leverage - A ball-drilling layout where the pin is 3-3/8" from the PAP and in a 1:30 direction from the CG. The CG is roughly contained within the grip and 4" to 5-1/2" from the PAP. No balance hole is needed.

Length - Expresses the ability of a ball to grip the lane in the presence of oil. Since the amount of oil on the lane usually decreases from front to back, balls that can grip the lane through heavier amounts of oil will change direction earlier, balls that can grip the lane only through lighter amounts of oil will change direction later.

Length - (BTM Ball Reviews) This is a guesstimate of the distance that you can expect AFTER THE BALL ENCOUNTERS FRICTION. All balls tend to skid in oil. That distance is not figured into our length equation.

Leverage Drilling - This is a drilling pattern that produces the maximum amount of track flare. The pin and CG are located at 3-3/8" from the bowler's PAP that places the core at a 45-degree angle to the axis line. This is an unstable position for a dynamic core. The core wants to move away from this location causing track flare. The track flare increases the friction between the ball and lane, which gets the ball into an early roll. Depending on the bowler's style, the added friction can sometimes increase the sharpness of the turn at the break point (especially for low RPM players); or for others (higher RPM players), cause the ball to slow down too much in the oil. This uses up the energy in the oil where the ball cannot hook very easily and reduces the turn at the break point.

✱ **Mass Bias** - A mark on the surface of the ball that indicates the position of center of mass of the positive half of the core on a pin-out ball. (Diagram)

Mica - Technically a rock material. It is added to balls to pearlize them. Pearlized balls normally skid further and then snap harder.

✱ **Mid line** - This is a terminology used on drilling sheets. It is the horizontal line

that extends from the center of the grip perpendicular to the midline.

Mid plane - This is a terminology used on drilling sheets. It is also called the vertical axis line. It is the line that runs vertically through the PAP, 90 degrees from the mid-line.

Moment of inertia - This, by definition, is the resistance to rotating motion. Mathematically, it is equal to the mass times the distance squared. The further the mass is away from the rotation point the harder it is to rotate (or to slow down). It is interchangeable with radius of gyration as far as the effect to the ball reaction.

Particle balls - These are the newest super hookers - reactive resin on steroids. They create the most friction in heavy oil, generally suited for dry lanes.

✱ **Pin** - A mark on the surface of the ball that indicates the position of the top of the core, or the position of the weight block, inside the ball.

✱ **Pin in** - This is a ball that was manufactured with the pin and the center of gravity within 1-1/2" of one another.

✱ **Pin out** - This is a ball that was manufactured with the pin and the center of gravity distance greater than 1-1/2" from one another.

✱ **Positive axis point (PAP)** - This is the point on a ball that it wants to initially rotate about when a bowler releases it. The bowler's style determines this location. Each bowler should remember the location of their PAP. It is measured from the center of the grip over a distance along the midline and up or down a distance along the mid-plane (vertical axis line). For example: 5-1/4 and 1/4 up.

Radius of Gyration (RG) - Essentially is an indication of the resistance to rotation motion. It is equal to the square

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SENIOR SCRATCH TOURNAMENT SCHEDULE (continued)

Organization	Contact	Phone	Date	Location
SASBA	Jamie Brooks	800/370-6785	Aug 25-26	Plano Super Bowl, Plano, TX
		(annual championship)	Sep 8-9	Longview Lanes, Longview, TX
		(champion/non-champ.)	Sep 29-30	Paramount Bwl, New Brnfels, TX
			Oct 6-7	All Star Lanes, Shreveport, LA
			Oct 20-21	Astro Bowl, San Antonio, TX
SASBA Southeast	Jim King	800/682-2198		
			Sep 15-16	Madison Bowl, Nashville, TN
			Sep 22-23	Hurricane Lanes, Destin, FL
			Oct 27-28	Paris Lns, Paris, TN
SBA	Bob Janego	407/332-8762		
		407-332-0775	Aug 25-26	Neffers Bwl, Homosassa Spgs, FL
		(members/guest doubles)	Sep 7-8	Aloma Bwl, Winter Park, FL
			Oct 6-7	Bellair Lanes Daytona Beach, FL
			Oct 27-28	Royal Palms BC, Lake Placid, FL
Super Sr Tour	Len Miles	909/677-5887		
			Sep 2-3	Cal Bowl, Lakewood, CA
			Oct 6-7	Palomar Lns, Escondido, CA
WCST	Dick Sanders	760/363-8141		
			Sep 8-9	Buena Lanes, Ventura, CA
			Oct 27-28	Yorba Linda Lns, Yorba Lda., CA
West Coast Seniors	Lynn Brainard	813/982-3966		
			Aug 26	Oakfield Lanes, Brandon, FL

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root of the moment of inertia divided by the weight. ABC/WIBC limits are 2.430 - 2.800.

Reactive Resin - Offers more versatility and pin action with lots of hook potential. They are more sensitive to lane conditions and operator error, so reactive ball are generally more difficult to control. They can be sanded or polished to change their breakpoint. They are by nature less durable, but offer more striking power.

Spinner - This is a style of bowling referring to how a bowler releases the ball. The bowler's wrist rotates around the top of the ball at release causing the ball to spin down the lane (similar to a top). The axis is tilted up in the air and the track is small and

far away from the gripping holes. This style helps to get the ball down the lane before it hooks.

Stack Leverage - A drilling layout where the pin is 3-3/8" from the PAP and the CG is between 3" and 3-1/2" from the PAP and a line between the two is parallel or roughly parallel to the centerline of the grip. The balance hole is placed on a line from the grip center thru the CG on the vertical axis line.

Rev Leverage - The pin is placed 3-3/8" from the PAP and slightly above the grip midline in a 12:00 direction from the CG. The CG is placed 3" to 4" from the PAP in the thumb positive quadrant. The balance hole is 6" from the grip center on a line thru the CG. Balance hole should bring ball back to 1/2 oz. negative side weight.

* **Track** - The ball rolls on its track as it moves down the lane

✱ **Track flare** - this is the movement of the ball track on a ball caused by the differential RG designed into a ball. See differential RG.

Urethane - A very durable coverstock that can be sanded for more friction. It has much better pin action than polyester with a moderate hook potential. These are good all-purpose balls for the bowler who wants to use only one ball.

Vertical Axis Line - See Mid plane.

✱ **Weight Block** - A puck or puddle shaped dense material inside a ball, manufactured for balance purposes. [1]